

# Time - Motion Study Items and Exposure Time of Residual Spray Labor to DDT

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During June and July 1949, a limited time-motion study of spray-crew activities was conducted in Alabama, Arkansas, Tennessee, and Texas. Primarily, the study was designed to record accurately each of the numerous items of work performed by an individual spray-crew member during a complete work day. It is expected that, by critical analysis of accumulated data, a means of increasing operational efficiency may be developed.

The study in the four States included observation and timing of 2 two-man crews using hand spray cans with hand pumps; 9 two-man crews using hand cans charged with air from air reservoirs or compressors; 4 two-man crews using constant pressure spray cans; 1 two-man crew using power spray equipment; and 3 one-man crews using power spray equipment. These crews treated a total of 293 houses, at a total expenditure of 16,512 man-minutes. Each item of normal work performed during a day was timed, beginning with mixing and loading chemicals in the morning, through cleaning equipment after return to the base at night.

Table 1 is a composite summary of the three categories indicated, showing the relation between total time expended, actual spray time, and the time spray crews were in contact with spray material. It may be noted that crewmen in category number 1, which includes only two crews, spent a greater percentage of time spraying than those in category number 2, which includes nine crews. Had an equal number of crews been rated in each category, the percentages could well have been reversed since the first group consisted of well trained crews in one State and group number 2 consisted of crews from three States with variable degrees of training.

Because crews were not familiar with constant pressure spray cans, and because two-man crews were an exception in Tennessee, these categories were omitted from the summary.

In view of the relatively high percentage of time that spray crews were exposed to spray material, as revealed by table 1, it appeared that similar data for the entire residual spray program would provide valuable information for toxicological studies now being conducted. Table 2 was

Table 1

## SUMMARY OF TIME-MOTION STUDY ITEMS

Category No.	No. Houses	Total Man-Minutes Time Expended	Total Minutes Spray Time	Percent Total Time	Total Time in Contact with Insecticide	Percent Total Time
1	37	1,887.8	721.2	38.6	1,058.8	56.1
2	141	8,002.1	2,381.0	29.8	3,474.3	43.4
3	33	1,249.0	633.0	51.0	839.0	67.2

Note:

Category 1 — Hand spray cans — hand pumps. (two-man crews)

Category 2 — Hand spray cans — charged from air tank. (two-man crews)

Category 3 — Power spray equipment. (one-man crew)

Table 2

**PERCENTAGE OF TOTAL TIME RESIDUAL SPRAY PERSONNEL  
ARE EXPOSED TO DDT**

State	Time Actually Spraying		Time Filling Cans, Cleaning Equipment, Mixing, Etc.		Total Potential Exposure Time	
	Hours Per Day	Percent of Time	Hours Per Day	Percent of Time	Hours Per Day	Percent of Time
Alabama	3.04	38	1.50	19	4.56	57
Arkansas	3.30	41	1.10	14	4.40	55
Florida	3.04	38	1.84	23	4.88	61
Georgia	3.28	41	2.08	26	5.36	67
Kentucky	3.00	38	1.50	19	4.56	57
Louisiana	2.33	30	1.84	22	4.17	52
Mississippi*	6.98	87	-	-	6.98	87
Missouri	2.81	35	2.48	31	5.28	66
North Carolina	6.16	77	0.64	8	6.80	85 (Power)
	4.96	62	1.84	23	6.80	85 (Hand)
Oklahoma	-	-	-	-	3.36	42
South Carolina	2.80	35	1.60	20	4.40	55
Tennessee	3.44	43	0.88	11	4.32	54
Texas	3.15	39	0.50	6	3.60	45
Average		43		15		58

\*Hours and percentage shown for Mississippi include travel and contact time in addition to actual spray time, time for filling cans, cleaning equipment, and mixing. A further breakdown is not available.

compiled from data collected during the time-motion study in four States, and from actual or estimated data from the other nine residual-spray States.

It should be noted (footnote) that hours of spray time for Mississippi include travel time. The average travel time for all States covered by the time-motion study was 27 percent of the total time. Applying this percentage to the Mississippi data, actual spray time for that State is 60 percent. The percentage of time actually expended in spraying varies, according to these data, from 30 to 77 percent. In this case, the high percentage of productive time was achieved through the use

of power spray equipment. Other factors also were involved. The average spray time for all States is 43 percent. The percentage of the time that crews are shown to be in contact with spray material varies from 42 percent in one State to 85 percent in another State. The average for all States, according to these data, is 58 percent.

From the foregoing, it can be seen that spray crews are in contact with spray material a considerable portion of the day. Constant efforts should be made to impress upon crew members, especially in the training of new employees, the necessity for frequent removal of spray material from hands, face, and other exposed skin surfaces.